

single capstan series



TM-9

DIGITAL TAPE TRANSPORT

TM-9200 TAPE MEMORY SYSTEMS

AMPEX



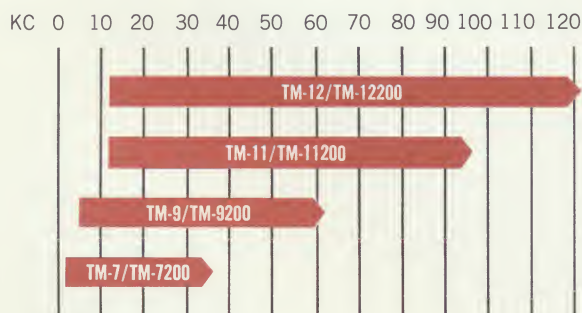
AMPEX SINGLE CAPSTAN SERIES

meets all your data transfer requirements . . .

The Ampex Single Capstan Series provides electronic data processors with a COMPLETE RANGE of ultra-reliable tape memories—with transfer rates from 1 to 120 KC. All tape drives and systems of the series offer FIELD PROVEN RELIABILITY—at least 2,000 hours MTBF, at least ONE BILLION start/stop operations before replacement parts may be needed in the drive mechanism. During data reliability tests on these transports, 33 data blocks of 1,024 characters (all "1"'s in IBM format) were recorded at 800 cpi. These blocks were re-read cyclically; over 160,000 passes were made of the test tape without a single character error being detected!

The Ampex Single Capstan Series offers a number of advantages. All units of the Series are INTERFACE INTERCHANGEABLE with each other. You can choose the drives to match your requirements . . . intermix them . . . and easily exchange drives if your requirements vary. They all write and read IBM compatible 7- or 9-track formats. Service requirements are similar for all units; replacements are readily available from one source.

BROAD RANGE OF SINGLE CAPSTAN TRANSFER RATES

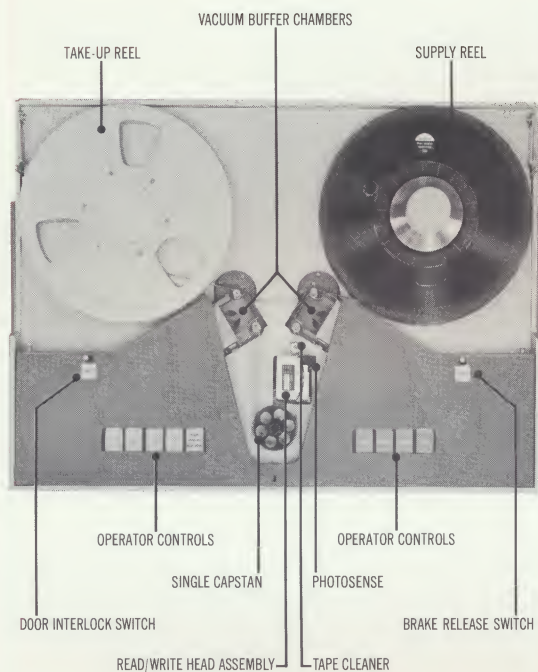


TM-9 in lowboy enclosure.

TM-9 DIGITAL TAPE TRANSPORT TM-9200 TAPE MEMORY SYSTEMS

set new standards for tape memory performance

- **High MTBF, minimal servicing, no tape path adjustment**
Decreased number of components and extreme mechanical simplicity result in reliability equal to or exceeding other computer equipment.
- **Increased data reliability**
Dropout errors are virtually eliminated because the oxide side of the tape is in sliding contact with minimal surfaces (read/write head and tape cleaner).
- **Maximum protection of tapes**
Controlled-tension tape path, plus minimal number of strategically placed tape guides, results in greatly increased tape life and maximum tape protection.
- **Full restriction-free programming**
Positive control of start/stop cycles (with NO shock transients as induced by pinch rollers, clutches and vacuum capstan tape movement devices) results in tape memory programming and operation with no restrictions whatever.
- **Perfect rewind packing assured**
During rewind, tape is NOT REMOVED from the vacuum chambers—even, constant tension is always applied to the rewinding tape pack, assuring safe storage of tapes and trouble-free reuse.
- **Interface interchangeable**
Since Ampex DE-200 Data Electronics are used in ALL Single Capstan Systems, all units are interchangeable with each other—allowing use of a combination of drives, or replacement to up-grade a system.



FRONT VIEW OF TM-9 TRANSPORT

TM-9 TAPE DRIVE

In this single-capstan tape drive (with patented Single Capstan Electronic Servo Control)*, tape is held in contact with the capstan at *all times* by uniform tension derived from twin vacuum columns. Tape motion over the read-write head directly follows that of the capstan surface, regardless of wide changes in the friction properties of the tape or mechanism. There is no "dead time" or tape velocity "over-shoot" during start/stop cycles—thereby allowing the full start/stop time to be utilized for uniform and gentle tape accelerations and decelerations. Start/stop characteristics and nominal tape speed are determined SOLELY by the servo-driven single-capstan—and are held constant regardless of normal environment, line voltage or frequency variations.

* Patent No. 3,185,364

TM-9211

TAPE MEMORY SYSTEM

The TM-9211 is a complete tape memory system for use with medium speed computers — as on-line or auxiliary tape memory for input and output — or for other digital applications that require moderate-to-high transfer rates. It is designed to write, read and check digital data in IBM computer formats with bit densities to 800 cpi.

All data and logical control signals are transferred through the input/output panel directly to the controlling unit. The tape memory system includes the following circuits: input buffers, write deskew, write (NRZI) registers, write power gate, read amplifiers, peak detectors, read deskew, strobe generator and output drivers. Optional features include the addition of: vertical parity generation, vertical parity checking, write echo and rate check, longitudinal parity generation, longitudinal parity checking, read reverse and triple density.

In the data electronics, data lines are fed via input buffers into the write input gates. A write strobe pulse, generated by customer equipment, strobes the data at the input gate to allow its entry. The strobed data triggers one-shot delays which compensate for static skew due to head mechanical tolerances.

The delayed outputs drive the NRZ register—which in turn controls the write head drivers. The NRZ register is reset for the longitudinal parity check by a "write reset pulse," provided by customer equipment. The write power is gated with the write permit gate.

Skew corrected read head outputs from the local data electronics (read/write) unit are fed to linear differential amplifiers prior to peak detection. The peak detectors have different clipping levels for the write check and read operations. A higher clipping level is used during the write check operation to overcome the effect of the write-to-read cross-talk and to ensure sufficient amplitude for clipping at a lower level on subsequent reading.

The peak detected read information enters a read deskew register. A strobe pulse, derived from the first arriving bit of each character, gates the information out of the interface unit and resets the deskew register. The strobe pulse is delayed an interval of one-half frame during the read operation.

OPERATOR AND REMOTE CONTROL FUNCTIONS



OPERATOR CONTROLS

Operator and remote controls are designed to accept tape input control signals, to provide output control signals and to acknowledge signals to the customer's equipment. Controls also include the logic for Rewind to Load Point, File Protect and other computer oriented functions. An Operator Control Panel is supplied with the unit for local operation and indication. Indicators show the status of the system under both *local* and *remote* command conditions.

POWER SWITCH AND INDICATOR

In the "on" position, the transport and its control logic is activated. In the "off" position, the transport and its control logic is deactivated and all power to the transport is off.

REMOTE SWITCH AND INDICATOR

When the Remote Switch is pressed, a white light indicates (a) transport ready, (b) remote operation, (c) all remote input/output lines are enabled. On a shared system (up to 1 x 4) the white light *a*/so indicates proper unit selection from the computer or programming device. If proper unit selection has not been accomplished, the light will be red.

LOCAL SWITCH AND INDICATOR

When this momentary switch is depressed (and the "transport ready" is true), the transport is conditioned to accept control commands generated by the local switches only. The remote state is reset and remote indicator turned off. When power is first applied, or "transport ready" is false, the transport is automatically set to the local state.

RESET (STOP) SWITCH

When this momentary contact switch is depressed,

the tape is unconditionally stopped, and the transport set to local state.

FORWARD (TO LOAD POINT) SWITCH

This momentary switch is used in normal operation when a new file reel is mounted. When the switch is depressed, tape is automatically loaded into the vacuum chambers, driven in the forward direction and stopped automatically at the load point. If the tape is already loaded and the switch is depressed, the tape will be driven in the forward direction. This switch is enabled only in the local state.

REVERSE SWITCH

When this momentary contact switch is depressed, the tape is driven in the reverse direction and stops automatically at the load point. If the tape is at the load point and the switch is depressed, the tape is driven in the reverse direction to the physical beginning of the tape.

REWIND TO LOAD POINT SWITCH

When this momentary switch is depressed, the tape is driven at rewind speed in the reverse direction until it stops automatically at the load point. If the tape is at the load point and the switch is depressed, the command is ignored. This switch is enabled only in the local state.

HIGH/LOW DENSITY SWITCH AND INDICATOR

This switch selects one of two density modes; provisions are made to indicate the mode selected.

FILE PROTECT INDICATOR

When this indicator is illuminated, no writing is permitted on the tape unit. It is on when: (a) no file is mounted, or (b) a file reel is mounted which does not have a write enable ring.

TM-9 in standard
19" enclosure.

PERFORMANCE CHARACTERISTICS



TM-9 in 1x4 configuration.

TM-9 DIGITAL TAPE DRIVE

Tape Speeds:

75 ips nominal; any other single speed from 45 to 75 ips is standard; dual or multiple speeds available to 75 ips maximum

Tape Width and Thickness:

½-inch width, 1.5-mil by 2400 feet (732 meters) — for best performance use Ampex Types 832, 838, 839 — or 1.0-mil by 3600 feet (1098 meters)

Tape Reels:

10½-inch (26.7 cm) IBM or NAB type

Recording Density:

Any two standard IBM densities (200/556/800 cpi). Tri-density available as option.

Standard Recording Formats:

- (a) 7-track, NRZI, 0.75 inch IRG (IBM 7330, 729 Series compatible)
- (b) 9-track ASCII, 0.6 inch IRG (IBM 360, 2400 Series compatible)

Rewind Time:

130 seconds maximum for 2400' of tape (732 meters)

Start/Stop Time (at 75 ips):

6.5 milliseconds, maximum

Turn-Around Time (at 75 ips):

13.0 milliseconds, maximum

Instantaneous Speed Variation:

±5%, maximum

Interchannel Time Displacement (at 75 ips):

±6 microseconds with any ½", 1.5-mil tape

Input Voltage and Frequency:

Voltage: 100–250 VAC, incrementally tapped
Frequency: 48 to 63 Hz

Operating Environment:

Ambient Temperature: 40° to 110° F (5° to 43° C)
Relative Humidity: 20% to 80% (with no condensation)
Altitude: 0 to 7500 feet (2287 meters) operating

Dimensions:

	Height	Width	Depth
Standard Console Enclosure	45.5" 115.6 cm	28" 71.1 cm	21.5" 54.6 cm
Standard 19" Enclosure	67" 170.2 cm	22.5" 56.5 cm	31" 78.7 cm

TM-9211 TAPE MEMORY SYSTEM

Packing Densities:

200, 556, 800 cpi (any combination of two front panel-selectable densities is standard); triple density selection available either manual or remote, or as manual/remote combination.

Standard* Input and Output Levels:

	FALSE	TRUE
Input Voltage Levels	0 ± 1.25v	–9v to –25v
Output Voltage Levels	0 ± 1.25v	–12v ± 2v
Output Current Levels	5 ma max. from load	5 ma min. to load

* Other standard and optional levels available.

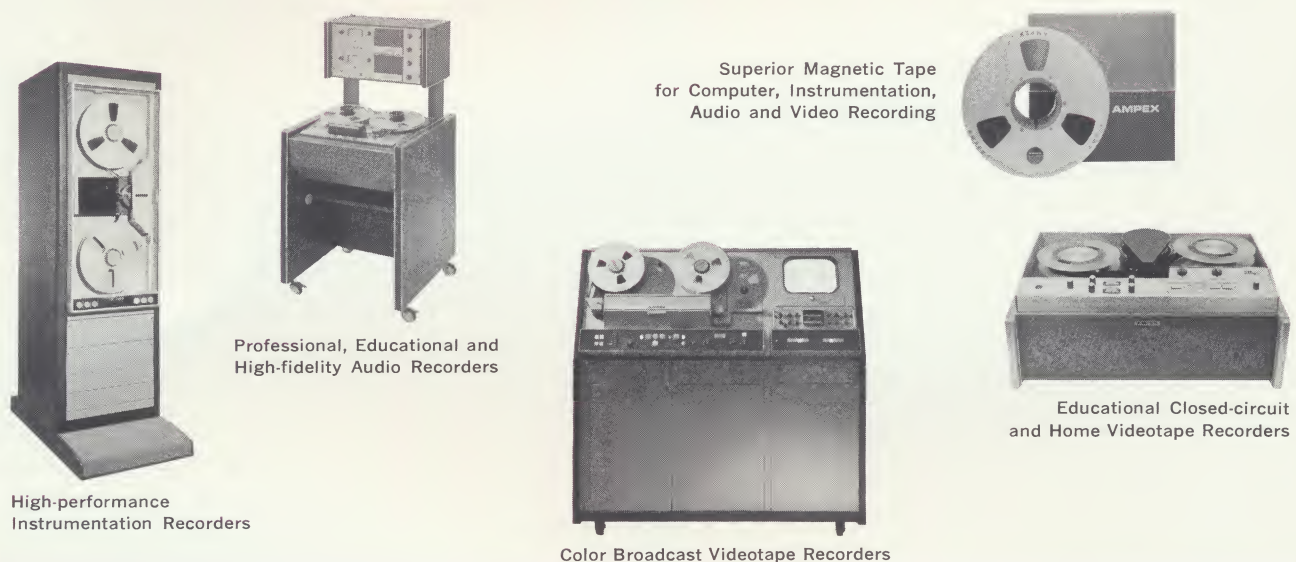
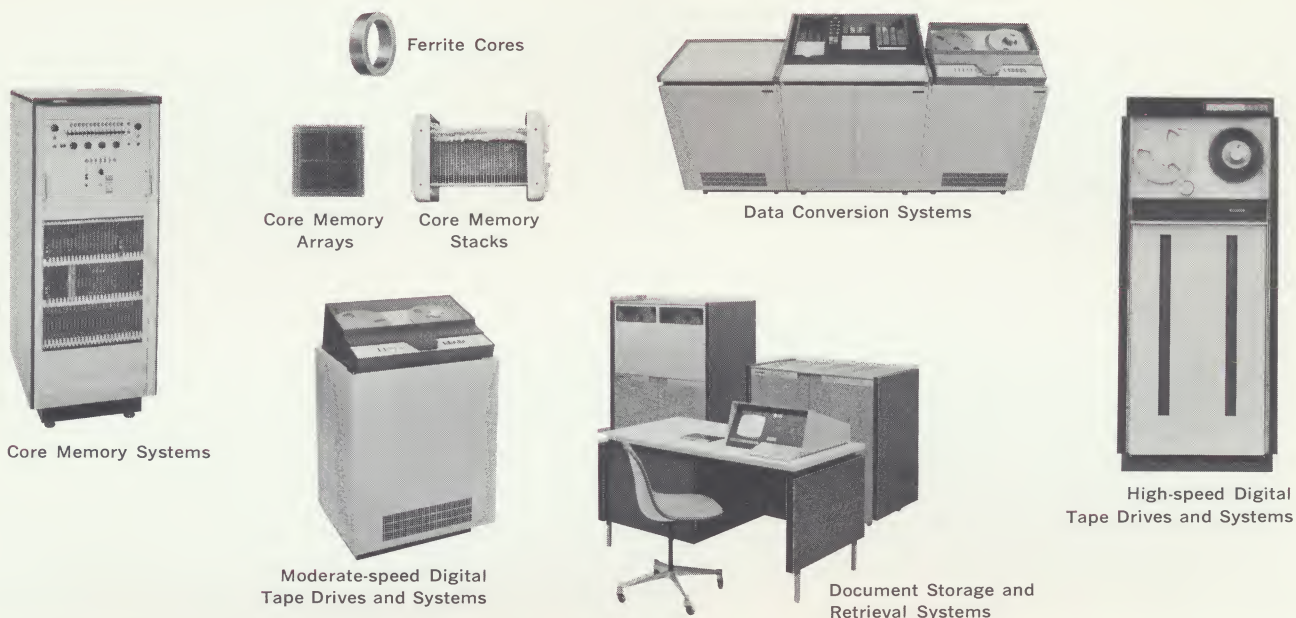
Input Impedance:

2000 ohms nominal, 3000 ohms maximum

Options:

- (a) Vertical Parity, selective odd/even: Generate, Check, Generate and Check
- (b) Longitudinal Parity: Generate, Check, Generate and Check
- (c) Write Echo and Rate Error Check
- (d) Write Echo and Rate Error and Vertical Parity Check
- (e) Reverse Read Capability (character-by-character)

AMPEX CORPORATION... world leader in digital tape drives and systems, core memories and components, data handling devices, instrumentation, audio and video recorders . . . magnetic tape for all forms of recording



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